

NDB - Steps Common to all Environments

The following steps describe the procedure for installing the components of NDB that are common to all environments.

- Step 1: Allocate a DBRM library for use with NDB
 - Step 2: Generate NDB I/O module NDBIOMO
 - Step 3: Assemble and link NDBIOMO - Job I055, Step 1610
 - Step 4: Create NDB plan - Job I055, Step 1630
 - Step 5: Modify, assemble and link NDB parameter module
 - Step 6: Link-edit NATGWDB2 - Job I055, Step 1680
 - Step 7: Modify, assemble and link NATPARM
 - Step 8: Relink your Natural nucleus
 - Step 9: Load Natural objects into system file - Job I061, Step 1600
 - Step 10: Load Natural error messages into system file - Job I061, Step 1620
 - Step 11: Create NDB server stub - Job I070, **Steps 1604,1606,1608,1610**
 - Step 12: Bind DBRM ROUTINEN into package - **Job Ixxx, (???) Steps yyyy (???)**
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Step 1: Allocate DBRM library for use with NDB

Allocate a PDS as DBRM (**database request module**) library. The size of this dataset and the number of directory entries depend on the particular site (5 tracks and 20 directory blocks **should** be adequate for most environments). The PDS **should** have a fixed-block record format and a record length of 80.

Any standard dataset name can be used for this DBRM library; however, this installation procedure assumes that the name SAGLIB.SMADBRM is used.

Step 2: Generate NDB I/O module NDBIOMO - Job I055, Step 1600

By executing a standard Natural batch job, this step generates the assembly source for NDBIOMO from the member NDBIOTM.

This batch job invokes the Natural program NDBGENI, which is loaded with INPL during the base Natural installation. NDBGENI contains the following two parameters, which you can modify to meet your specific requirements:

- the DB-environment parameter, which must be set to:
 - DB2V5 if you are running **DB2 Version 5**
 - **DB2V6 if you are running DB2 Version 6**
 - **DB2V7 if you are running DB2 Version 7**
- the parameter to specify the number of statements for dynamic access.

NDBIOMO performs the dynamic access to DB2 and contains all necessary EXEC SQL statements. In addition, it contains some special SQL statements which cannot be executed in dynamic mode.

An output report is created by this job and **should** be checked for successful completion. In addition, a condition code of 0 indicates normal completion.

Step 3: Assemble and link NDBIOMO - Job I055, Step 1610

Precompile, assemble and link NDBIOMO.

Note:

The link-edit step receives a condition code of 4 because of unresolved references for DSNHLLI. This is normal and can be ignored.

Step 4: Create NDB plan - Job I055, Step 1630

If desired, change library names and plan name to meet site requirements.

Step 5: Modify, assemble and link NDB parameter module Job I055, Steps 1640/1650 or 1660/1670 or 1675/1676

The NDB parameter module contains the macro NDBPRM with parameters specific to the Natural interface to DB2.

You can generally use the default values for all parameters. Modify only the values of the parameters whose default values do not suit your requirements.

The individual parameters are described in the section Parameter Module NDBPARM.

- When the file server is **not** to be used:
Execute the Steps 1640 and 1650; the resulting parameter module is called NDBPARM.
- When the file server is to be used:
Execute the Steps 1660 and 1670; the resulting parameter module is called NDBPARMF.
- When the file server uses the Software AG Editor buffer pool as storage medium:
Execute the Steps 1675 and 1676; the resulting parameter module is called NDBPARME.

Step 6: Link-edit NATGWDB2 - Job I055, Step 1680

Link-edit the environment-independent NDB nucleus NATGWDB2. Verify that the INCLUDE cards refer to the corresponding DD names for the load libraries.

Step 7: Modify, assemble and link NATPARM

Adapt your Natural parameter module NATPARM by adding parameters specific to Natural for DB2 and reassemble NATPARM.

Step 8: Relink your Natural nucleus

Natural for DB2 basically consists of:

- An environment-independent nucleus, which can be shared by multiple environments and which is therefore LPA-eligible.
- Environment-dependent components, which must be linked to the appropriate Natural environment-dependent interface.

Modify the JCL used to link your Natural shared nucleus by adding the following INCLUDE card:

INCLUDE SMALIB(NATGWDB2)	Environment-independent NDB nucleus from Step 6
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Modify the JCL used to link your Natural environment-dependent nucleus by adding the following INCLUDE cards and the corresponding DD statements:

INCLUDE SMALIB(NDBPARM)	NDB parameter module created in Step 5
INCLUDE SMALIB(NDBIOMO)	NDB I/O module created in Step 3
INCLUDE DSNLIB(DSNTIAR)	SQL Error Message Module
INCLUDE xxxxxxxx(yyyyyyyy)	Environment-dependent DB2 Interface (see below)

If you want to use the Natural File Server, include SMALIB(NDBPARMF) or SMALIB(NDBPARME) instead of SMALIB(NDBPARM); see also Step 5 above.

Depending on your environment(s), INCLUDE the appropriate environment-specific language interface xxxxxxxx in the library xxxxxxxx as shown in the following table:

Interface	Library	Environment
DSNALI	DSNLIB	Under TSO and in batch mode without running under the control of the DSN command processor (that is, with CAF).
DSNRLI	DSNLIB	WLM (Workload Manager) stored procedure address space.
DSNELI	DSNLIB	Under TSO and in batch mode when running under the control of the DSN command processor.
DSNCLI	DSNLIB	Under CICS
DFSLI000	IMSLIB	Under IMS/TM (MPP and BMP) and in batch mode by using the DB2 DL/I batch support (DSNMTV01).
NDBCOM	NDBLIB	Under Com-plete.

Note:

If you want to use NDB in various environments (that is, with different TP monitors), you must repeat this step for each of these environments.

Instead of link-editing your Natural nucleus in the way described above, you have the following alternatives:

1. If you do not use a Natural shared nucleus, all modules must be included in the link-edit of the Natural nucleus.
2. Remove NATGWDB2 from the link-edit of the Natural shared nucleus and run it as a separate module with the mandatory entry name NATGWDB2. You can modify the name of the module created in Step 6. However, if you use a name different from NATGWDB2, this name must be specified as an alias name in an NTALIAS macro entry of the Natural parameter module. This way of link-editing only applies if the Natural Resolve CSTATIC Addresses feature (RCA) is used.
3. Include all modules in the link-edit job of a separate Natural parameter module with the mandatory entry name CMPRMTB. The name of the resulting module is arbitrary. This way of link-editing only applies if an alternative parameter module (PARM profile parameter) is used.
If link-editing is done in this way, you can install NDB without having to modify your Natural nucleus or driver.

If link-editing is done according to number [2] or [3], the following applies:

TP Monitor	Requirement
CICS	The resulting module must be defined via a PPT entry or RDO. PPT entry: DFHPPT TYPE=ENTRY, PROGRAM=module-name, PGMLANG=ASSEMBLER
Com-plete	The resulting module must be defined as RESIDENTPAGE or reside in the LPA/(E)LPA.

Step 9: Load Natural objects into system file - Job I061, Step 1600

Before executing this step, change the CMWKF01 DD statement to point to the NDB \textit{nnn} .INPL dataset.

In this step, the NDB system programs, maps and DDMs are loaded into the Natural system files. The INPL job loads objects into the **Natural system** libraries SYSDDM, SYSTEM and SYSDB2.

The NDB system programs **must** be loaded into the **Natural 4.1**. FNAT system file.



Warning:

Ensure that your newly created SYSDB2 library contains all necessary Predict interface programs, which are loaded into SYSDB2 when installing Predict (see the relevant Predict documentation).

Step 10: Load Natural error messages into system file - Job I061, Step 1620

Before executing this step, change the CMWKF02 DD statement to point to the NDB \textit{nnn} .ERRN dataset.

This step executes a batch Natural job that runs an error load program **by** using the NDB \textit{nnn} .ERRN dataset as input. The ERRLODUS job loads error messages into the library SYSERR on the FNAT system file.

The NDB error messages **must** be loaded into the **Natural 4.1**. FNAT system file.

Step 11: Create NDB server stub - Job I070, **Steps 1604,1606,1608,1610**

Create **server stubs** to execute **Natural** stored procedures and **Natural user-defined functions**. Natural for DB2 (**NDB**) **server stubs are interface modules** between the DB2 database system and the Natural server. In order to execute **Natural stored procedures and Natural user-defined functions**, the server stub needs to be installed.

There are **two types** of **server stub**:

1. The **NDB server stub** (module **NDB41SRV**, Steps 1604 and 1606).
The server stub **is used to execute Natural stored procedures and Natural user-defined functions**.

The IBM LE (Language Environment) runtime modules required must be linked to the NDB server stub module. Use the **CALL option of the linkage editor** and assign the LE runtime library as SYSLIB.

2. The **NDB start server stub** (module **NDB41STR**, Steps 1608 and 1610)
The start server stub is used to start the Natural server **environment(s)** explicitly.

The IBM LE (Language Environment) runtime modules required must be linked to the NDB start server stub module. Use the **CALL option of the linkage editor** and assign the LE runtime library as SYSLIB. **Additionally**, include **the** modules NDBSTRP and NATCONFIG from NDB \textit{xxx} .LOAD and NAT \textit{xxx} .LOAD. **The modules are delivered with NDB**.

The **NDB server** stubs are generated from the NDBSTUB macro. You can generally use the default values for all parameters. Modify only the values of the parameters whose default values do not suit your requirements. The individual parameters are described in the section Natural for DB2 **Server Stub**.

The resulting load modules have to be placed into a steplib library of the JCL used to execute the **DB2** stored procedure address space.

For **DB2 for OS/390 Version 5 and below**, each Natural stored procedure or Natural user-defined function **must be defined in the SYSIBM.SYSPROCEDURES table of the DB2 catalog, and the LOADMOD column must contain the name of the generated NDB server stub module NDB41SRV**.

For DB2 UDB for OS/390 Version 6 and above, each Natural stored procedure or Natural user-defined function must be defined by a DB2 CREATE PROCEDURE or DB2 CREATE FUNCTION statement, where the name of the NDB server stub module NDB41SRV generated is specified as EXTERNAL NAME.

Step 12: Bind DBRM ROUTINEN into package - Job Ixxx, (???) Steps yyyy (???)

Bind DBRM ROUTINEN into a package. DBRM ROUTINEN is contained in the collection SAGNDBROUTINENPACK and delivered with NDB???. NDB needs this collection for accessing the DB2 catalog and retrieving the parameter descriptions of Natural stored procedures and Natural user-defined functions.